

What is claimed is:

1 1. An optical disc comprising a title area and a manager  
2 area, wherein

3 the title area stores a plurality of video  
4 titles, each of which is a video production and which  
5 each include route information and a plurality of pieces  
6 of video information retrieved according to the route  
7 information,

8 wherein there are three types of video titles  
9 which are a first type, a second type, and a third type,  
10 with video titles of the first type being retrieved  
11 according to only a piece of route information, video  
12 titles of the second type being retrieved according to a  
13 plurality of pieces of route information and branch  
14 information, and video titles of the third type being  
15 retrieved according to a plurality of pieces of route  
16 information without the branch information,

17 and wherein the manager area includes:

18 an address management information area for  
19 storing a plurality of pieces of address management  
20 information which each include an address of one of the  
21 plurality of video  
22 titles; and

23 a playback type information area for storing a  
24 plurality of pieces of playback type information, wherein  
25 the plurality of pieces of playback type information  
26 correspond to the plurality of pieces of address  
27 management information, each of the plurality of pieces  
28 of playback type information including a first flag and a  
29 second flag, of which the first flag indicates whether a  
30 corresponding video title is retrieved according to a

31 piece of route information or according to a plurality of  
32 pieces of route information, and the second flag  
33 indicates whether the route information of the  
34 corresponding video title includes the branch  
35 information.

1 2. The optical disc of Claim 1, wherein

2 each of the plurality of pieces of playback type  
3 information indicates that a disc reproduction apparatus  
4 can execute AV functioning for a corresponding video  
5 title if the corresponding video title is at least in one  
6 of a first case and a second case, wherein in the first  
7 case, the first flag indicates that the corresponding  
8 video title is retrieved according to only one piece of  
9 route information, and in the second case, the second  
10 flag indicates that the route information of the  
11 corresponding video title does not include the branch  
12 information, and

13 wherein the AV functioning at least includes a  
14 search function for allowing the disc reproduction  
15 apparatus to search and reproduce an arbitrary portion of  
16 a video title and a feedback function for allowing the  
17 disc reproduction apparatus to monitor and display a  
18 reproduction elapsed time.

1 3. The optical disc of Claim 2, wherein

2 the playback type information includes a third  
3 flag which indicates whether all pieces of route  
4 information of a corresponding video title are of a  
5 normal playback type, wherein the normal playback type is  
6 a type in which the plurality of pieces of video  
7 information specified by the route information are  
8 sequentially reproduced in a predetermined order.

1 4. The optical disc of Claim 2, wherein the playback  
2 type information includes a fourth flag which indicates  
3 whether all pieces of route information of a  
4 corresponding video title are of a branch-in-title type,  
5 wherein the branch-in-title type is a type in which a  
6 current video title does not branch to another video  
7 title.

1 5. The optical disc of Claim 2, wherein the playback  
2 type information includes a fifth flag which indicates  
3 whether all pieces of route information of a  
4 corresponding video title are of a branch destination  
5 auto selection type, wherein the branch destination auto  
6 selection type is a type in which a default branch  
7 destination is specified for a case when no branch  
8 destination has been selected by an operator.

1 6. The optical disc of Claim 2,  
2 wherein each of the plurality of pieces of video  
3 information includes a plurality of video blocks, wherein  
4 each of the plurality of video blocks includes video data  
5 and unit time management information, wherein the video  
6 data is compressed data of a certain unit time and the  
7 unit time management information controls a reproduction  
8 during the certain unit time, and

9 wherein the title area includes a plurality of  
10 index number tables each including a plurality of index  
11 numbers and search destination information that indicates  
12 addresses of video blocks respectively corresponding to  
13 the plurality of index numbers, wherein the plurality of  
14 index number tables correspond to a plurality of pieces  
15 of route information of the first type and the second  
16 type.

1 7. The optical disc of Claim 6,  
2 wherein the plurality of video blocks are  
3 arranged in an order of reproduction in a direction of  
4 rotation of the optical disc, and  
5 wherein the title area further includes a  
6 plurality of time map tables including information  
7 indicating a relation between the plurality of video  
8 blocks and a plurality of time codes, wherein a time code  
9 is displayed by the disc reproduction apparatus when a  
10 corresponding video block is reproduced, wherein the  
11 plurality of time map tables correspond to a plurality of  
12 pieces of route information of the first type and the  
13 second type.

1 8. The optical disc of Claim 2, wherein the manager area  
2 and the title area are formed on a surface of an  
3 information layer, wherein the information layer is  
4 formed between a first transparent substrate and a second  
5 transparent substrate, each of the first transparent  
6 substrate and the second transparent substrate having a  
7 thickness range of 0.5mm to 0.7mm.

1 9. A disc reproduction apparatus for reproducing an  
2 optical disc, the optical disc comprising a title area  
3 and a manager area, wherein the title area stores a  
4 plurality of video titles, each of which is a video  
5 production and which each include route information and a  
6 plurality of pieces of video information retrieved  
7 according to the route information, wherein the manager  
8 area includes: an address management information area for  
9 storing a plurality of pieces of address management  
10 information each of which includes an address of one of  
11 the plurality of video titles; and a playback type

information area for storing a plurality of pieces of  
 playback type information, wherein the plurality of  
 pieces of playback type information correspond to the  
 plurality of pieces of address management information,  
 wherein each of the plurality of pieces of playback type  
 information includes a first flag and a second flag, the  
 first flag indicating whether a corresponding video title  
 is retrieved according to only one piece of route  
 information or according to a plurality of pieces of  
 route information, and the second flag indicating whether  
 the route information of the corresponding video title  
 includes the branch information, wherein each of the  
 plurality of pieces of playback type information  
 indicates that the disc reproduction apparatus can  
 execute AV functioning in a corresponding video title if  
 the corresponding video title is at least in one of a  
 first case and a second case, wherein in the first case,  
 the first flag indicates that the corresponding video  
 title is retrieved according to one piece of route  
 information, wherein in the second case, the second flag  
 indicates that the route information of the corresponding  
 video title does not include any branch information,  
 wherein the AV functioning at least includes a search  
 function for allowing the disc reproduction apparatus to  
 search and reproduce an arbitrary portion of the video  
 title and a feedback function for allowing the disc  
 reproduction apparatus to monitor and display a  
 reproduction elapsed time,  
 the disc reproduction apparatus comprising:  
 an optical pickup for optically reading data from  
 the optical disc;

43 a drive mechanism for driving the optical pickup;  
44 first controlling means for controlling the drive  
45 mechanism to have the optical position read data from the  
46 manager area;

47 a manager buffer for storing the data read by the  
48 first controlling means;

49 receiving means for receiving a video title  
50 selected by an operator to be reproduced;

51 calculating means for calculating an address of  
52 the video title selected by the operator by referring to  
53 the manager buffer;

54 second controlling means for controlling the  
55 drive mechanism to move the optical pickup and to have  
56 the video title read from a position specified by the  
57 address calculated by the calculating means;

58 judging means for judging whether the AV  
59 functioning can be executed in the video title read by  
60 the second controlling means by referring to the first  
61 flag and the second flag corresponding to the video  
62 title; and

63 AV functioning executing means for executing the  
64 AV functioning only when the judging means judges that  
65 the AV functioning can be used in the video title.

1 10. The disc reproduction apparatus of Claim 9, wherein  
2 the judging means includes:

3 a search condition table storing unit for storing  
4 a search condition table which includes a combination of  
5 flag values, the combination of flag values being a  
6 condition under which the search function is executed;

7 a playback type information fetching unit for  
8 fetching a piece of playback type information from the

9 manager buffer corresponding to the video title selected  
10 by the operator; and

11 a condition comparing unit for comparing a  
12 combination of flag values in the piece of playback type  
13 information fetched by the playback type information  
14 fetching unit with the combination of flag values in the  
15 search condition table,

16 wherein the AV functioning executing means  
17 includes:

18 a search destination receiving unit for  
19 generating, on receiving an instruction to execute the  
20 search function from the operator, an interrupt request  
21 specifying a search destination; and

22 a search function executing unit for instructing  
23 the second controlling means to change a position of the  
24 optical pickup to the search destination only when the  
25 combination of flag values in the fetched playback type  
26 information matches the combination of flag values in the  
27 search condition table.

1 11. The disc reproduction apparatus of Claim 10, wherein  
2 the combination of flag values in the search condition  
3 table is one of a first case and a second case, wherein  
4 in the first case, the first flag indicates that the  
5 corresponding video title is retrieved according to only  
6 one piece of route information, wherein in the second  
7 case, the second flag indicates that the route  
8 information of the corresponding video title does not  
9 include any branch information.

1 12. The disc reproduction apparatus of Claim 11,  
2 wherein the playback type information includes a  
3 third flag which indicates whether all pieces of route

4 information of a corresponding video title are of a  
5 normal playback type,

6            wherein the normal playback type is a type in  
7   which the plurality of pieces of video information  
8   specified by the route information are sequentially  
9   reproduced in a predetermined order,

10           wherein the combination of flag values in the  
11   search condition table is one of a third case and a  
12   fourth case, wherein in the third case, the third flag  
13   indicates that all pieces of route information of the  
14   corresponding video title are of the normal playback type  
15   and the first flag indicates that the corresponding video  
16   title is retrieved according to only one piece of route  
17   information, wherein in the fourth case, the third flag  
18   indicates that all pieces of route information of the  
19   corresponding video title are of a normal playback type  
20   and the second flag indicates that the route information  
21   of the corresponding video title does not include any  
22   branch information, wherein

23           the condition comparing unit compares the  
24 combination of flag values in the piece of playback type  
25 information fetched by the playback type information  
26 fetching unit with the combination of flag values in the  
27 search condition table.

1 13. The disc reproduction apparatus of Claim 11, wherein  
2 the playback type information includes a fourth flag  
3 which indicates whether all pieces of route information  
4 of a corresponding video title are of a branch  
5 destination auto  
6 selection type,



7 wherein the branch destination auto selection  
8 type is a type in which a default branch destination is  
9 specified when no branch destination has been selected by  
10 an operator,

11 wherein the combination of flag values in the  
12 search condition table is one of the first case, the  
13 second case, and a fifth case, wherein in the fifth case,  
14 the fourth flag indicates that all pieces of route  
15 information of the corresponding video title are of the  
16 branch destination auto selection type,

17 wherein the condition comparing unit compares the  
18 combination of flag values in the piece of playback type  
19 information fetched by the playback type information  
20 fetching unit with the combination of flag values in the  
21 search condition table.

1 14. The disc reproduction apparatus of Claim 10, wherein  
2 each of the plurality of pieces of video information  
3 includes a plurality of video blocks, wherein each of the  
4 plurality of video blocks includes video data and unit  
5 time management information, wherein the video data is  
6 compressed data of a certain unit time and the unit time  
7 management information controls a reproduction during the  
8 certain unit time,

9 wherein the title area includes an index number  
10 table including a plurality of index numbers and search  
11 destination information which indicates addresses of  
12 video blocks respectively corresponding to the plurality  
13 of index numbers, an index number table corresponds to a  
14 piece of route information,

15 wherein the search destination receiving unit, on  
16 receiving a numeral input by the operator as an index

17 number, refers to the index number table and determining  
18 an address of a video block corresponding to the input  
19 index number as the search destination,  
20 wherein the search function executing unit  
21 instructs the second controlling means to change a  
22 position of the optical pickup to the search destination  
23 only when the combination of flag values in the fetched  
24 playback type information matches the combination of flag  
25 values in the search condition table.

1 15. The disc reproduction apparatus of Claim 14 further  
2 comprising:

3 program start instruction receiving means for  
4 receiving from the operator a notification of inputting a  
5 plurality of index numbers for a programmed reproduction;

6 holding means for holding a set of index numbers  
7 if the search destination receiving unit receives a  
8 plurality of numerals from the operator as the set of  
9 index numbers after the program start instruction  
10 receiving means has received the notification of  
11 inputting a plurality of index numbers; and

12 programmed reproduction executing means for  
13 activating the search function executing unit as many  
14 times as the number of index numbers in the set of index  
15 numbers so that the search function executing unit  
16 instructs the second controlling means to sequentially  
17 change the position of the optical pickup to the search  
18 destinations corresponding to the index numbers in the  
19 set of index numbers.

1 16. The disc reproduction apparatus of Claim 10, wherein

2 each of the plurality of pieces of video  
3 information includes a plurality of video blocks which

Patent Office

4 are arranged in time series in an order of reproduction,  
5 wherein each of the plurality of video blocks includes  
6 video data and unit time management information, wherein  
7 the video data is compressed data of a certain unit time  
8 and the unit time management information controls a  
9 reproduction during the certain unit time,

10 wherein the title area includes a plurality of  
11 time map tables including information indicating a  
12 relation between the plurality of video blocks and a  
13 plurality of time codes,

14 wherein a time code is displayed by the disc  
15 reproduction apparatus when a corresponding video block  
16 is reproduced,

17 wherein the plurality of time map tables  
18 correspond to a plurality of pieces of route information  
19 of the first type and the second type,

20 wherein the search destination receiving unit  
21 for, on receiving a numeral input by the operator as a  
22 time code, referring to the time map table and  
23 determining an address of a video block corresponding to  
24 the input time code as the search destination,

25 wherein the search function executing unit  
26 instructs the second controlling means to change a  
27 position of the optical pickup to the search destination  
28 only when the combination of flag values in the fetched  
29 playback type information matches the combination of flag  
30 values in the search condition table.

1 17. The disc reproduction apparatus of Claim 9, wherein  
2 the judging means includes:

3 a feedback condition table storing unit for storing  
4 a feedback condition table which includes a combination

5 of flag values, the combination of flag values being a  
6 condition under which the search function is executed;  
7 a playback type information fetching unit for  
8 fetching a piece of playback type information from the  
9 manager buffer corresponding to the video title selected  
10 by the operator; and  
11 a condition comparing unit for comparing a  
12 combination of flag values in the piece of playback type  
13 information fetched by the playback type information  
14 fetching unit with the combination of flag values in the  
15 feedback condition table,  
16 wherein the AV functioning executing means  
17 includes:  
18 a monitoring unit for monitoring an amount of  
19 progress of the optical pickup which progresses under  
20 control of the second controlling unit;  
21 a feedback function executing unit for generating  
22 display feedback information based on the amount of  
23 progress of the optical pickup monitored by the  
24 monitoring unit only when the combination of flag values  
25 in the fetched playback type information matches the  
26 combination of flag values in the feedback condition  
27 table; and  
28 a displaying unit for displaying the display  
29 feedback information generated by the feedback function  
30 executing unit.

1 18. The disc reproduction apparatus of Claim 17, wherein  
2 the combination of flag values in the feedback  
3 condition table is one of a first case and a second case,  
4 wherein in the first case, the first flag indicates that  
5 the corresponding video title is retrieved according to a

6 piece of route information, wherein in the second case,  
7 the second flag indicates that the route information of  
8 the corresponding video title does not include the branch  
9 information.

1 19. The disc reproduction apparatus of Claim 18,  
2 wherein the playback type information includes a  
3 third flag which indicates whether all pieces of route  
4 information of a corresponding video title are of a  
5 normal playback type,

6 wherein the normal playback type is a type in  
7 which the plurality of pieces of video information  
8 specified by the route information are sequentially  
9 reproduced in a predetermined order,

10 wherein the combination of flag values in the  
11 feedback condition table is one of a third case and a  
12 fourth case, wherein in the third case, the third flag  
13 indicates that all pieces of route information of the  
14 corresponding video title are of the normal playback type  
15 and the first flag indicates that the corresponding video  
16 title is retrieved according to a piece of route  
17 information, wherein in the second case, the third flag  
18 indicates that all pieces of route information of the  
19 corresponding video title are of a normal playback type  
20 and the second flag indicates that the route information  
21 of the corresponding video title does not include the  
22 branch information,

23 wherein the condition comparing unit compares the  
24 combination of flag values in the piece of playback type  
25 information fetched by the playback type information  
26 fetching unit with the combination of flag values in the  
27 feedback condition table.



11 destination information which indicates addresses of  
12 video blocks respectively corresponding to the plurality  
13 of index numbers, wherein the index number table  
14 corresponds to a piece of route information,  
15           wherein the monitoring unit monitors an address  
16 of a video block read by the optical pickup and refers to  
17 the index number table to determine an index number which  
18 corresponds to the monitored address,  
19 wherein the feedback function executing unit generates  
20 the display feedback information based on the index  
21 number determined by the monitoring unit only when the  
22 combination of flag values in the fetched playback type  
23 information matches the combination of flag values in the  
24 feedback condition table,  
25           wherein the displaying unit displays the display  
26 feedback information generated by the feedback function  
27 executing unit.

1 22. The disc reproduction apparatus of Claim 21,  
2 wherein each of the plurality of video titles in the  
3 optical disc has an identification number,

4            wherein the monitoring unit further monitors the  
5    identification number of a video title read by the  
6    optical pickup,

7            wherein the feedback function executing unit  
8   generates the display feedback information based on the  
9   identification number of the video title monitored by the  
10   monitoring unit and the index number determined by the  
11   monitoring unit when the combination of flag values in  
12   the fetched playback type information matches the  
13   combination of flag values in the feedback condition  
14   table, wherein the feedback function executing unit

15 generates the display feedback information based on only  
16 the identification number of the video title monitored by  
17 the monitoring unit when the combination of flag values  
18 in the fetched playback type information does not match  
19 the combination of flag values in the feedback condition  
20 table,

21 wherein the displaying unit displays the display  
22 feedback information generated by the feedback function  
23 executing unit.

1 23. The disc reproduction apparatus of Claim 17,

2 wherein each of the plurality of pieces of video  
3 information includes a plurality of video blocks which  
4 are arranged in time series in an order of reproduction,

5 wherein each of the plurality of video blocks  
6 includes video data and unit time management information,  
7 wherein the video data is compressed data of a certain  
8 unit time and the unit time management information  
9 controls a reproduction during the certain unit time,

10 wherein the optical disc includes a time map  
11 table including information indicating a relation between  
12 the plurality of video blocks and a plurality of time  
13 codes,

14 wherein a time code is displayed by the disc  
15 reproduction apparatus when a corresponding video block  
16 is reproduced,

17 wherein the feedback function executing unit  
18 includes:

19 an initial time code displaying unit for  
20 displaying an initial time code with a certain format  
21 when the second controlling means starts reading the  
22 video title;



23           a progress monitoring unit for monitoring a video  
24 block read by the optical pickup; and

25           a time code updating unit for displaying a time  
26 code corresponding to the video block monitored by the  
27 progress monitoring unit by referring to the time map  
28 table, wherein the time code updating unit updates the  
29 initial time code first and continues to update as  
30 reading of data by the optical pickup progresses.

1   24. The disc reproduction apparatus of Claim 23,  
2 wherein each of the plurality of video titles in the  
3 optical disc has an identification number,

4           wherein the monitoring unit further monitors the  
5 identification number of a video title read by the  
6 optical pickup,

7           wherein the feedback function executing unit  
8 generates the display feedback information based on the  
9 identification number of the video title monitored by the  
10 monitoring unit and one of the initial time code and the  
11 time code displayed by the time code updating unit when  
12 the combination of flag values in the fetched playback  
13 type information matches the combination of flag values  
14 in the feedback condition table,

15           wherein the feedback function executing unit  
16 generates the display feedback information based on only  
17 the identification number of the video title monitored by  
18 the monitoring unit when the combination of flag values  
19 in the fetched playback type information does not match  
20 the combination of flag values in the feedback condition  
21 table,

22            wherein the displaying unit displays the display  
23 feedback information generated by the feedback function  
24 executing unit.

1    25. The disc reproduction apparatus of Claim 9, wherein  
2       the playback type information includes a fourth  
3 flag which indicates whether all pieces of route  
4 information of a corresponding video title are of a  
5 branch-in-title type,

6            wherein the branch-in-title type is a type in  
7 which a current video title does not branch to another  
8 video title,

9            wherein the disc reproduction apparatus further  
10 comprises:

11           program start instruction receiving means for  
12 receiving from the operator a notification of inputting a  
13 plurality of index numbers for a programmed reproduction;

14           title number receiving means for receiving a  
15 numeral input by the operator as a title number;

16           branch judging means for, every time the title  
17 number receiving means receives a title number, judging  
18 whether a video title corresponding to the title number  
19 received by the title number receiving means branches to  
20 another video title by referring to flags in the playback  
21 type information of the video title;

22           holding means for holding a set of video title  
23 numbers corresponding to video titles judged by the  
24 branch judging means as not branching to another video  
25 title; and

26           programmed reproduction executing means for  
27 activating the calculating means and the second  
28 controlling means as many times as the number of the

29 video title numbers in the set of video title numbers so  
30 that the video titles corresponding to the video title  
31 numbers in the set of video title numbers are read in  
32 sequence.

1 26. A method, applied to a disc reproduction apparatus  
2 including a buffer, of reproducing an optical disc, the  
3 optical disc comprising a plurality of video titles, a  
4 plurality of pieces of management information, and a  
5 plurality of pieces of playback type information, wherein  
6 each of the plurality of video titles includes route  
7 information and a plurality of pieces of video  
8 information retrieved according to the route information,  
9 wherein each of the plurality of pieces of management  
10 information manages an address of a corresponding video  
11 title, wherein each of the plurality of video titles is a  
12 video production, wherein each of the plurality of pieces  
13 of playback type information includes a first flag and a  
14 second flag, wherein the first flag indicates whether a  
15 corresponding video title is retrieved according to a  
16 piece of route information or according to a plurality of  
17 pieces of route information, and the second flag  
18 indicates whether the route information of the  
19 corresponding video title includes the branch  
20 information, the method comprising:

21 a first writing step of writing a piece of  
22 management information into the buffer;

23 a first receiving step of receiving a video title  
24 selected by an operator to be reproduced;

25 a calculating step of calculating an address of  
26 the video title selected by the operator by referring to  
27 the buffer;

28           a second controlling step of reading the video  
29 title from a position specified by the address calculated  
30 by the calculating step;

31           a judging step of judging whether AV functioning  
32 can be executed in the video title read in the second  
33 controlling step by referring to the first flag and the  
34 second flag corresponding to the video title, wherein the  
35 AV functioning at least includes a search function for  
36 allowing the disc reproduction apparatus to search and  
37 reproduce an arbitrary portion of the video title and a  
38 feedback function for allowing the disc reproduction  
39 apparatus to monitor and display a reproduction elapsed  
40 time; and

41           an AV functioning executing step of executing the  
42 AV functioning only when the judging step judges that the  
43 AV functioning can be used in the video title.